Higher Still
Notes

www.hsn.uk.net

# Higher
# Information Systems

HSN31020
Database Systems
Important Concepts

## Contents

# Important Concepts

## Entity

An entity is a group of data items (ie the headings of a table).

An 'entity instance' is the equivalent of a 'record' in a computer database – a row of the table.

Each data item in the entity is a field on the computer – a column of the table.

In the theory of relational databases, a table is known as a 'relation', while rows are called 'tuples' and columns are 'attributes'.

## Dependency

Where a field (A) is functionally dependent on another (B), there can only be one value of A for each unique value of B. This is illustrated below, where **Name** is functionally dependent on **ID**:

| ID | Name |
|---|---|
| 1 | John |
| 2 | Ross |
| 3 | Susan |
| 4 | John |

For each unique **ID**, there is one value of **Name**.

The value of **ID** can be said to *functionally determine* the value of **Name**, eg when the **ID** is "1", **Name** is always "John".

## Keys

A **primary key** is a data item, or group of data items, which uniquely identifies an entity instance (record), as only one instance can have a particular value of the primary key.

A primary key functionally determines the values of all other fields in a particular record, as the definition of a primary key is that all other fields are functionally dependent on it. So in the table above, ID is the primary key.

A **concatenated key** is a primary key which consists of more than one data item.

A **foreign key** is a data item (or group of data items) in an entity, holding the value of the primary key of another entity. Foreign keys are identified with an asterisk, *. They are used to establish relationships between entities, always forming the 'many' end of a relationship.

## Repeating Group

In an un-normalised entity, a repeating group is a collection of data items (fields) which have more than one value for each unique record. The repeating group should be obvious if you are given a sample of the data:

| Shop ID | Shop Location | Telephone No. | Staff ID | Staff Name | Post |
|---|---|---|---|---|---|
| 7262 | Edinburgh | 0131 4349816 | 5242AB | Karen Wilson | Manager |
| | | | 7262DG | Harry Jones | Supervisor |
| 9928 | Glasgow | 0141 5726481 | 9882UY | Gina Ross | Manager |
| | | | 4433QW | Lesley Pugh | Supervisor |
| | | | 6523GC | Fred Kinder | Sales Assistant |

In this example the repeating group is the set of data items Staff ID, Staff Name and Post.

The aim of First Normal Form (1NF) is to remove this repeating group by creating a new entity, then establishing relationships between the resulting entities.

## Partial Dependency

Data items which are uniquely described by only a part of a concatentated key are said to be partially dependent on the primary key.

The aim of Second Normal Form (2NF) is to remove this partial dependency by moving the partially dependent data items to a new entity along with the part(s) of the key they are dependent on. The part(s) of the key then become foreign key(s) in the original entity, and the primary key in the new entity.

## Transitive Dependency

Data items which are uniquely described by a non-key field are said to be transitively dependent on the primary key.

The aim of Third Normal Form (3NF) is to remove the transitive dependency by removing the data items, and the non-key field they are dependent on, to a new entity, and making the determinant field the primary key. The non-key field then becomes a foreign key in the original entity.

| Invoice No. | Customer No. | Customer Name |
|---|---|---|
| 4587 | 00546 | Emma Hughes |
| 4588 | 00546 | Emma Hughes |
| 4589 | 00879 | John Field |

→

| Invoice No. | *Customer No. |
|---|---|
| 4587 | 00546 |
| 4588 | 00546 |
| 4589 | 00879 |

| Customer No. | Customer Name |
|---|---|
| 00546 | Emma Hughes |
| 00879 | John Field |